REMARKS

Claims 1-12 and 20-38 are pending and at issue in this application. This paper is being presented in response to non-final Office Action dated October 18, 2006.

I. Status of the Claims

Claims 29-35 have been determined to be allowable over prior art. Claims 3-5, 7-11, 22-25, 28 and 37 are objected to as being dependent upon a rejected claim, but would be allowable if rewritten in independent form. Claims 1, 2, 6, 12, 20, 21, 26, 27, 36 and 38 are rejected under 35 U.S.C. §103(a). Claims 13-19 had been previously withdrawn from consideration.

II. Response to October 18, 2006 Office Action

Applicants respectfully traverse the rejection of claims 1, 2, 6, 12, 20, 21, 26, 27, 36 and 38 under 35 U.S.C. §103(a) as being unpatentable over Gibson (6,473,388) in view of Libove et al. (5,473,244) because the Office Action failed to establish a *prima facie* case of obviousness at least because 1) it failed to establish that all claim elements are taught or suggested in the prior art, and 2) it failed to identify a motivation or suggestion to make the alleged combination. Reconsideration and withdrawal of the rejections of claims 1, 2, 6, 12, 20, 21, 26, 27, 36 and 38 are respectfully requested in view of the following remarks.

1. Claims 1, 2, 6 and 12

Claim 1 recites a method that includes detecting a variation in resistance within a layered material stack in response to a scanning and injection of a non-contacting, remotely sourced electron stream into the layered material stack, the layered material stack having a first conductive contact layer, a second conductive contact layer, a variable resistive layer and a fixed resistive layer being positioned between the first and second conductive contact

layers, and the variation in resistance within the layered material stack being based on one of a first resistive state and a second resistive state of the variable resistive layer. The method also includes generating a first magnetic field and a second magnetic field within a transformer in response to the variations in resistance from within the layered material stack when the electron stream is scanned across the layered material stack, the transformer being operatively coupled to the first and second conductive contact layers; and generating a differential output signal within the transformer based on the first and second magnetic fields, the differential output signal being associated with one of the first and second resistive states of the variable resistive layer.

In particular, claim 1 recites a material stack having a first conductive contact layer, a second conductive contact layer, a variable resistive layer and a fixed resistive layer being positioned between the first and second conductive contact layers and a transformer operatively coupled to the first and second conductive contact layers. This transformer generates a differential output signal within the transformer based on the first and second magnetic fields, the differential output signal being associated with one of the first and second resistive states of the variable resistive layer. None of these elements are taught or suggested by Gibson or Libove. Moreover, no motivation or suggestion to make the alleged combination of the cited prior art is identified.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *See M.P.E.P.* Section 2143.03, *citing In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970) ("All words in a claim must be considered in judging the patentability of that claim against the prior art."). Here, the alleged combination of Gibson's method with Libove's disclosure fails to teach or suggest all the limitations of the claims.

With respect to the material stack, Gibson describes, at most, only some of the elements recited in claim 1. Even if it were allowed, as suggested by the Office Action, that the electrode (106) corresponds to the first conductive layer recited in claim 1, Gibson does not teach a second conductive layer. The power supply (122) in Gibson's disclosure cannot be considered a second conductive layer because the ground layer referred to at page 3 in the Office Action does not come into immediate physical contact with any of the aforementioned layers of the material stack and cannot therefore be considered to be a part of the stack.

Moreover, if the first contact layer is considered to be both the electrode (106), and the positive terminal of the power supply directly connected to the electrode, as is clearly implied in the Office Action at page 3, the ground terminal of the power supply fails to correspond to the second conductive layer in claim 1 because claim 1 specifically recites two additional layers, a fixed resistive layer and a variable resistive layer, disposed *between* the two conductive layers. Further, Fig. 1 in Gibson's disclosure and the related part of the description of the drawings clearly indicate that no part of the material stack is or can be disposed <u>inside</u> the power supply. Therefore, contrary to the examiner's contention, Gibson does not teach a second conductive layer, as recited in claim 1.

Moreover, no other element in Gibson's disclosure can be considered a second conductive layer. For example, electrodes 106 and 108 in Gibson, though both conductive, are not layers of a material stack, as recited in claim 1, because they do not have a fixed resistive layer and a variable resistive layer between them. Gibson clearly discloses that only "an information storage region" (col. 2, line 49) <u>of the cathodoconductive medium</u> is located between the electrodes 106 and 108 (*see* Gibson, col. 3, lines 31-53). The electrically insulating substrate 102 and the cathodoconductive medium 104 are disposed as the two layers of storage device 100 (col. 2, lines 13-21). Clearly, the spatial configuration of elements disclosed in Gibson does not support, contrary to the examiner's contention, that they are the same as the four layers recited in claim 1. Therefore, Gibson does not teach a layered material stack having a first conductive contact layer, a second conductive contact layer, a variable resistive layer and a fixed resistive layer being positioned between the first and second conductive contact layers.

Claim 1 further recites a transformer operatively coupled to the first and second conductive layers separated by a fixed resistive layer and a variable resistive layer. Clearly, the output signal in the method recited in claim 1 cannot be produced by the configuration of elements set forth in the Office Action. It is immediately obvious to one of ordinary skill in the art that the alleged conductive layers (106, 122) pointed out by the examiner in Gibson cannot, by virtue of their electrical connections, be operatively coupled to a transformer to "obtain the resistance state of the storage area" (*Office Action*, p.5). Therefore, contrary to the examiner's contention, the proposed combination of Gibson's and Libove's disclosures

does not teach or suggest a transformer operatively coupled to first and second conductive layers that are separated by a fixed resistive layer and a variable resistive layer.

With respect to measuring the output current using a transformer, the Office Action specifically points to the embodiment represented schematically in Fig. 22B in Libove wherein the variation in current in the carrier (150) induces a magnetic field which, in turn, drives a secondary circuit. The secondary circuit induces a secondary magnetic field which serves to compensate for the error caused by a misaligned split in the ferromagnetic core (151) (col. 22, 48-63). It is a characteristic feature of this embodiment that non-primary coils are used only for corrections to the primary measurement and do not generate a differential output signal based on the first and second magnetic fields as recited in claim 1. Given Libove's design of the circuit and the accompanying description of its functionality, it is unclear how one of ordinary skill in the art would combine the prior art of Libove and Gibson to arrive at the combination proposed in the Office Action. Since no direct application of Libove to Gibson is possible, the Office Action fails to establish that the applied art teaches all limitations of the claims.

Another necessary requirement for establishing a *prima facie* case of obviousness is to identify a suggestion in the prior art to make the proposed combination. *See M.P.E.P.*, Section 2143.01; *see also*, *In re Rouffet*, 47 USPQ2d 1453, 1457-58 (Fed. Cir. 1998) (The combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a prima facie case of obvious was held improper.). Here, the Office Action fails to identify a suggestion or motivation in the art to make the specific combination it proposes.

Gibson describes a method of ascertaining the state of a phase change material by inducing an electric field between two electrodes making contact with a cathodoconductive medium made of this material. An electron beam bombards the area of the phase change material between the electrodes and creates a number of electron and hole carriers. The amount of carriers produced by the electron beam depends on the state of the phase change material. The carriers are accelerated by the electric field toward one of the electrodes. An additional read circuit detects the changes in magnitude of the current through one of the electrodes. The relative magnitude of the current effectively communicates the state of the phase change material via the read circuit.

It is an important characteristic of the method suggested by Gibson that the arrangement of electrodes and materials directs the flow of carriers across the phase change material only. In fact, it appears instrumental in Gibson's disclosure to have all electrodes make contact directly with the phase change material. Meanwhile, claims 1-38 generally relate to a method wherein the state of a variable resistive layer can be ascertained by measuring the relative flow of carriers from the phase change material toward the two conductive layers disposed below and above the layer of the variable resistive material.

Libove's invention describes a method of measuring voltage, current, and power in wires and cables. As presented by Libove, the background to the invention is that "there are no commercially available *non-contact* systems which measure voltages in the wires for single conductors, cables, or printed circuit board traces" (col. 1, lines 58-60) (emphasis added). Importantly, Libove purports to solve the specific problem of making contact with the conductive means when one needs to measure the current therethrough.

The Office Action alleges on page 5 that one of ordinary skill in the art would be motivated to utilize Libove's method to measure the state of Gibson's phase resistive layer "because the transformer/voltage measuring means output a signal such as voltage or current representing the resistance state of the resistive layer." But Gibson already offers a solution to the problem of obtaining the resistive state: induce an electric field between the electrodes and read the output signal from one of the electrodes. Moreover, Libove describes a solution, specifically illustrated in Fig. 22B cited in the Office Action, that specifically addresses the need to avoid physical contact with a conductive means. The Office Action fails to establish why one be motivated to avoid physical contact with the conductive means 104 in Gibson's disclosure.

Furthermore, by describing a method wherein the output signal indicative of the resistive state is obtained from the circuit (124) connected to an electrode (108) (*see* col. 5, lines 36-37), Gibson effectively teaches away from applying Libove's non-contact method to Gibson's.

Consequently, it is submitted that a *prima facie* case of obviousness does not exist with respect to the cited references and that the rejection of claim 1 should be withdrawn. Moreover, because claims 2, 6, and 12 depend from claim 1, it is believed that these claims are also allowable.

2. Claims 20, 21, 26 and 27

Claim 20 is directed to a method that includes injecting a non-contacting, remotely sourced electron stream from an energy source into a material stack of data storage medium, the material stack having a first and second conductive contact layers, a variable resistive information storage layer and a fixed resistive layer being positioned between the first and second conductive contact layers, the variable resistive information storage layer having a different resistance to each of the first and second conductive layers, the electron stream engaging the variable resistive layer through the first conductive contact layer, and the variable resistive layer having a plurality of resistive states. The method also includes detecting a difference in current distributed to the first and second conductive contact layers via a sensor in response to the injection of the electron stream into the material stack, the sensor having a first winding operatively coupled to the first conductive contact layer and a second winding operatively coupled to the second conductive contact layer, the sensor configured to generate an output signal proportional to the difference in the plurality of resistive states of the variable resistive layer, based on the difference in current between the first and second conductive contact layers.

In particular, claim 20 recites, similar to claim 1, a material stack having a first and second conductive contact layers, a variable resistive information storage layer and a fixed resistive layer being positioned between the first and second conductive contact layers.

Thus, Applicants submit that several of the arguments made above relative to claim 1 apply with equal force to claim 20. Consequently, claim 20 should be allowable as well. Moreover, because claims 21, 26 and 27 depend from claim 20, these claims are allowable at least because of their dependence from claim 20.

3. Claims 36 and 38

Claim 36 is directed to a method that includes detecting a number of variations in resistance within a layered material stack in response to a scanning and injection of an electron stream into the layered material stack, the layered material stack having a first conductive contact layer, a fixed resistive layer underlying the first conductive contact layer,

a variable resistive layer underlying the fixed resistive layer, and a substrate layer underlying the variable resistive layer, and the number of variations in resistance within the layered material stack being based on at least one of a first resistive state and a second resistive state of the variable resistive layer. It also includes generating a first magnetic field and a second magnetic field within a transformer in response to the number of variations in resistance from within the layered material stack when the electron stream is scanned across the layered material stack, the transformer being operatively coupled to the first conductive contact layer and the substrate layer. It further includes generating a differential output signal within the transformer based on a vector sum of the first and second magnetic fields, the differential output signal being associated with one of a number of resistive states of the variable resistive layer.

In particular, claim 36 recites, similar to claim 1, a material stack having a first and second conductive contact layers, a variable resistive information storage layer and a fixed resistive layer being positioned between the first and second conductive contact layers.

Thus, Applicants submit that several of the arguments made above relative to claim 1 apply with equal force to claim 36. Consequently, claim 36 should be allowable as well. Moreover, because claim 38 depends from claim 36, this claim is allowable at least because of its dependence from claim 36.

In view of the above remarks, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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